REMARKS

Claims 1-95 are now pending in the application. Claims 1, 17, 35, 47, 61 and 73 are amended herein.

While Applicants disagree with the current rejections, Applicants have amended the claims to expedite prosecution. Applicants reserve the right to pursue the claims as previously filed in one or more continuing applications. The amendments and newly added claims do not introduce new matter since they are supported by the specification of the present application as filed. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

Applicants would like to thank the Examiner for courtesy extended during the interview on December 13, 2007. During the interview, the Examiner agreed that several dependent claims, such as Claims 3 and 90-94, distinguish over the prior art of record subject to further consideration and/or search.

DOUBLE PATENTING

Claims 1, 17, 35, 47, 61, and 73 stand rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 7,133,473. This rejection is respectfully traversed. A terminal disclaimer is submitted herewith as suggested by the Examiner. Reconsideration and withdrawal of this rejection are respectfully requested.

REJECTION UNDER 35 U.S.C. § 103

Claims 1-95 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Claydon et al. (U.S. Pat. No. 6,154,871) in view of El-Gamal et al. (U.S. Pat. No. 7,010,054). This rejection is respectfully traversed.

With respect to Claim 1, Claydon and El-Gamal do not show, teach or suggest at least a space-time block decoder for a wireless communications system that includes a demodulator, a dimension demultiplexer, and/or a branch metric computation module, as claimed.

Claydon and El-Gamal do not at least show, teach or suggest: A) a space-time block decoder that includes a demodulator that generates a demodulated symbol sequence by derotating a signal constellation of a received symbol sequence that is encoded based on a space-time block code; B) a dimension demultiplexer that communicates with a demodulator and that generates in-phase and quadrature components of a demodulated symbol sequence; and C) a branch metric computation module that communicates with a dimension demultiplexer and that generates branch metrics based on in-phase and quadrature components generated by the dimension demultiplexer.

The invention as recited in Claim 1 provides an improved technique for the demodulation of a space-time block code. Space-time block code refers to the encoded transmission of blocks of symbols over multiple transmit antennas. An encoded symbol sequence is transmitted and received over different space and different time intervals. See the Background of the Invention section of the present application. A space-time block encoded signal may be received and provided to a maximum likelihood branch

metric calculation device. The received space-time block encoded signal includes matrices. The maximum likelihood branch metric calculation device generates multi-dimensional branch metrics based on the matrices. The branch metrics include multiple squared terms that are summed and squared, which require complex computations. This complicates the implementation of a space-time block decoder.

The invention of Claim 1 simplifies the computations involved in decoding a space-time block encoded signal by introducing the use of a demodulator and a dimension demultiplexer in a space-time block decoder, as claimed. The demodulator performs demodulation via derotation of a signal constellation of a received symbol sequence and the dimension demultiplexer provides in-phase and quadrature components of the demodulated symbol sequence. The in-phase and quadrature components may be considered single-dimensional components. The branch metric computation module generates branch metrics based on the in-phase and quadrature components, as opposed to a received encoded symbol sequence. Generation of branch metrics based on the in-phase and quadrature components reduces the complexity of the computations involved. See paragraph [0033] of the present application.

As best understood by Applicants, Claydon discloses demodulation of a convolutional encoded data sequence. Claydon does not disclose transmission of encoded data over multiple antennas or reception of data from multiple antennas. Therefore, Claydon does not disclose modulation and/or demodulation of a space-time block encoded data sequence.

Also, in Claydon the received convolutional encoded data sequence is demodulated via an oscillator and multipliers to generate in-phase and quadrature components. The in-phase and quadrature components are separately de-rotated for timing and carrier recovery purposes. In contrast, the invention of Claim 1 performs demodulation by performing a derotation and generates in-phase and quadrature components via a demultiplexer. The in-phase and quadrature components are based on a space-time block encoded symbol sequence. Thus, the elements of Claim 1 perform differently and are in a different relationship relative to each other than the devices of Claydon.

As best understood by Applicants, El-Gamal discloses a receiver that performs space-time block decoding. However, a generic receiver diagram is shown in El-Gamal that simply discloses a demodulator 301 and a space-time decoder 305. El-Gamal does not describe how the space-time block decoding is performed. Nevertheless, in the receiver diagram of El-Gamal, a single signal line is shown between the demodulator 301 and the space-time decoder 305, which seems to suggest that El-Gamal performs space-time block decoding as described in the Background of the Invention section of the present application. No other details with respect to space-time block decoding are provided.

Thus, Applicants submit that Claydon does not disclose space-time block decoding and although El-Gamal mentions space-time block decoding, El-Gamal does not describe how space-time block decoding is performed. Therefore, Claydon and El-Gamal clearly do not disclose one or more of the elements A-C stated above and thus the space-time block decoder of Claim 1.

It is a longstanding rule that to establish a prima facie case of obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ 143 (CCPA 1974), see MPEP §2143.03. Therefore, Claim 1 is allowable for at least these reasons.

Claims 35 and 61 are allowable for at least similar reasons as Claim 1. Claims 2-16, 36-46, 62-72 and 86-94 ultimately depend from Claims 1, 35 and 61 and are allowable for at least similar reasons.

With respect to Claim 3, Applicants note that the Examiner did not provide any comments directed to Claim 3 in the Office Action. Claim 3 recites derotation of a signal constellation and includes multiplication of a received symbol sequence by a conjugate of a channel response, which is described in at least paragraph [0029] of the present application. Applicants are unable to find disclosure of this derotation in the relied upon references. The absence of this disclosure in the relied upon references was agreed to by the Examiner in the Interview. Therefore, it is submitted that Claim 3 is allowable over the cited art.

With respect to Claim 17, as Claydon and El-Gamal do not disclose the generation of separated in-phase and quadrature components of a demodulated space-time block encoded symbol sequence, Claydon and El-Gamal do not at least show, teach or suggest a branch metric computation module that generates branch metrics based on such in-phase and quadrature components. Thus, Claydon and El-Gamal do not disclose the branch metric computation module as claimed.

Therefore, Claim 17 is allowable for at least the above reasons. Claims 47 and 73 are allowable for at least similar reasons as Claim 17. Claims 18-34, 48-60, 74-85 and 95 ultimately depend from Claims 17, 47 and 73 and are allowable for at least similar reasons.

With respect to Claims 15, 16, 20, 28, 33, 34, 37, 45, 46, 50, 54, 59, 60, 63, 66, 71, 72, 75, 79, 84 and 86-95, the Examiner simply states that the claimed subject matter would have been easily realized by one skilled in the art. It is not clear from the Office Action whether the Examiner is taking Official Notice with respect to Claims 15, 16, 20, 28, 33, 34, 37, 45, 46, 50, 54, 59, 60, 63, 66, 71, 72, 75, 79, 84 and 86-95. Applicants request clarification in this regard. An explicit recitation that Official Notice is being taken has not been provided by the Examiner.

Applicants submit that if Official Notice is not taken that the brief explanation provided by the Examiner falls far short of the type of explicit analysis that is required by the Supreme Court in *KSR Int'l v. Teleflex Inc.*, 550 U.S. ____ (2007). Absent such an express teaching or suggestion in the references, the explicit analysis and reasoning must be supplied by the Examiner. *Id.* In other words, the Examiner is required to provide explicit reasoning as to why one skilled in the art would be motivated to provide the features of Claims 15, 16, 20, 28, 33, 34, 37, 45, 46, 50, 54, 59, 60, 63, 66, 71, 72, 75, 79, 84 and 86-95.

Thus, Claims 15, 16, 20, 28, 33, 34, 37, 45, 46, 50, 54, 59, 60, 63, 66, 71, 72, 75, 79, 84 and 86-95 are further allowable for at least the above reasons.

With respect to Claim 90, the relied upon references fail to disclose the one-dimensional relationship between branch metrics, a demodulated symbol sequence and in-phase and quadrature components. As each in-phase and quadrature component is associated with a single dimension, the claimed invention enables the generation of one-dimensional branch metrics, as opposed to multi-dimensional branch metric. One-dimensional branch metrics may include scalar and vector terms. In other words, the information provided to a branch metric computation module is one-dimensional and thus easier to handle.

Thus, Claim 90 is further allowable for at leas the above reasons.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: December 27, 2007 By: _____

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